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# On several new or poorly-known Oriental Paradoxosomatidae (Diplopoda: Polydesmida), XXI

# О нескольких новых или плохоизученных ориентальных Paradoxosomatidae (Diplopoda: Polydesmida), XXI

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KEY WORDS: Diplopoda, Polydesmida, Paradoxosomatidae, taxonomy, new records, new species, key, Laos, Myanmar, Nepal, Vietnam.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, Polydesmida, Paradoxosomatidae, таксономия, новые находки, новые виды, ключ, Лаос, Мьянма, Непал, Вьетнам.

ABSTRACT. This contribution is devoted to records of several known, and descriptions of the following eight new, species: *Tylopus brehieri* sp.n., from Myanmar, *T. beroni* sp.n. and *Desmoxytes simplex* sp.n., both from Laos, *D. grandis* sp.n., *Anoplodesmus mirabilis* sp.n. and *Enghoffosoma contrastum* sp.n., all three from Vietnam, as well as *Beronodesmus martensi* sp.n. and *B. serratus* sp.n., both from Nepal. A key is given to all 11 currently known species of the endemic Nepalese genus *Beronodesmus* Golovatch, 2014.

РЕЗЮМЕ. Данное сообщение посвящено находкам нескольких известных, а также описаниям следующих восьми новых видов: *Tylopus brehieri* sp.n., из Мьянмы, *T. beroni* sp.n. и *Desmoxytes simplex* sp.n., оба из Лаоса, *D. grandis* sp.n., *Anoplodesmus mirabilis* sp.n. и *Enghoffosoma contrastum* sp.n., все три из Вьетнама, а также *Beronodesmus martensi* sp.n. и *B. serratus* sp.n., оба из Непала. Дан ключ для всех 11 ныне известных видов эндемичного непальского рода *Beronodesmus* Golovatch, 2014.

## Introduction

This paper is devoted to new records of a few known, as well as to descriptions of eight new, species of paradoxosomatid millipedes from Myanmar, Laos, Vietnam and Nepal.

## Material and methods

Much of the material is deposited in the collection of the Zoological Museum, Moscow State University, Russia (ZMUM). Several samples have been returned to the Muséum national d'Histoire naturelle (MNHN), Paris, France, the Natur-Museum Senckenberg (SMF), Frankfurt a.M., Germany, and the National Museum of Natural History (NMNHS), Sofia, Bulgaria, as indicated below.

## Taxonomic part

### *Tylopus brehieri* **sp.n.**

Figs 1–9.

HOLOTYPE ♂ (MNHN JA 139), Myanmar, Shan State, Kyauk Khaung (= Stone Cave), on wood close to river, 30.XI.2015, leg. Franck Bréhier (MY15-17-17).

PARATYPES: 3 ♀♀ (MNHN JA 139), same data, together with holotype.

DIAGNOSIS. Following the latest key to *Tylopus* spp. [Likhitrakarn et al., 2016], this new species keys out to couplet 5, but differs in showing only an indistinct sulcus basal to lobe **l** of the gonopod; also readily distinguished from congeners by the unique combination of the absence of a colour pattern, the presence of evident pleurosternal carinae on the segments of the anterior body part, as well as in the shapes of the various gonopod structures.

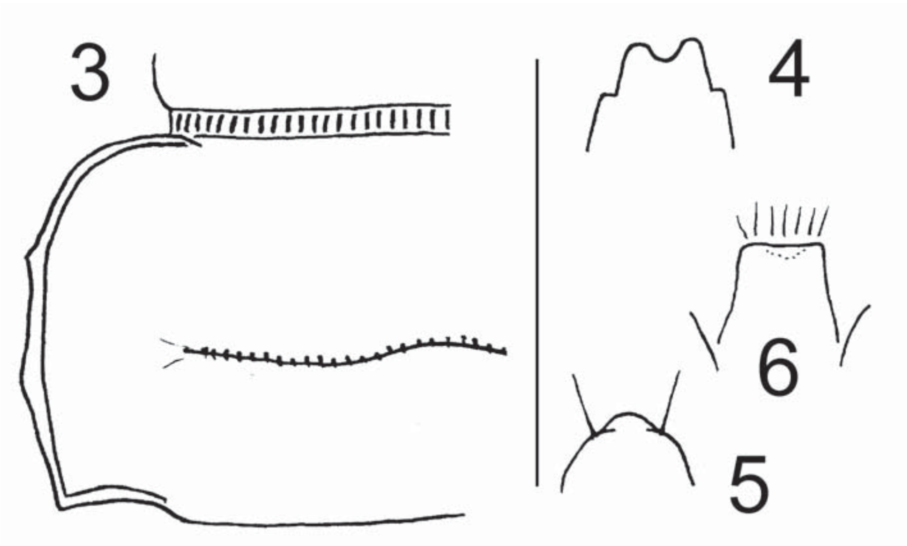
NAME. Honours Franck Bréhier (Saint-Girons, France), the collector.

DESCRIPTION. Length ca 19–20 mm (♂, ♀), width of midbody pro- and metazonae 1.5 (♂) or 1.7 (♀) and 2.0 mm, respectively (♂, ♀). General coloration in alcohol rather uniformly light brown (♀) to castaneous brown (♂), sides a little lighter, telson, legs and venter very light yellow-brown or greyish to nearly pallid (Figs 1 & 2).

Clypeolabral region densely setose, only a few setae between antennae, vertigial region bare; epicrani-




Figs 1–2. Habitus of *Tylopus brehieri* sp.n., ♂ holotype, dorsal and ventral views, respectively. Pictures by J. Brecko.
Рис. 1–2. Общий вид *Tylopus brehieri* sp.n., голотип ♂, соответственно сверху и снизу. Фотографии J. Brecko.

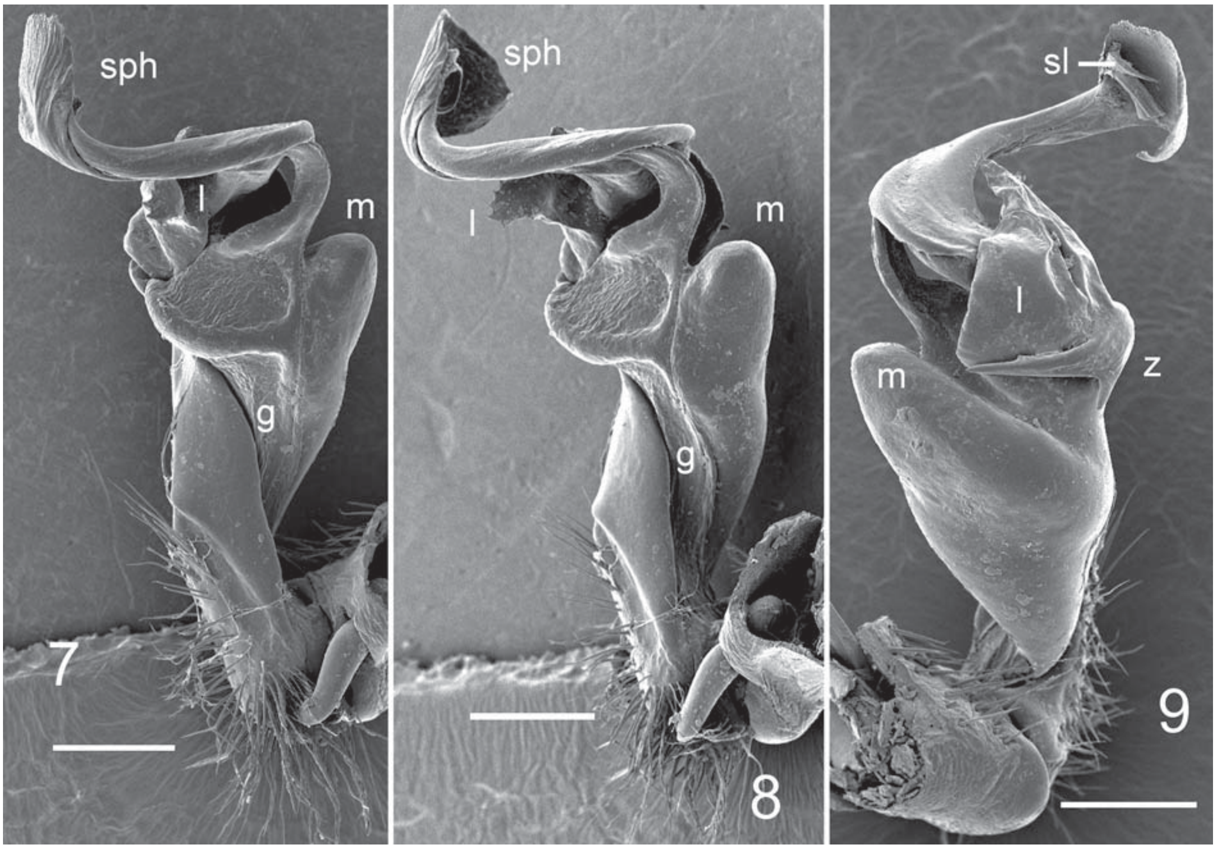



Figs 3–6. *Tylopus brehieri* sp.n., ♂ holotype. 3 — left half on metatergite 10, dorsal view; 4 — tip of epiproct, dorsal view; 5 — hypoproct, ventral view; 6 — sternal lobe between coxae 4, caudal view. Scale bar: 1.0 mm.

Рис. 3–6. *Tylopus brehieri* sp.n., голотип ♂. 3 — левая половина метатергита 10, сверху; 4 — кончик эпипрокта, сверху; 5 — гипопрокт, снизу; 6 — стернальная пластинка между тазиками 4, сзади. Масштаб: 1,0 мм.

al suture thin, superficial. Antennae rather long and moderately clavate (Fig. 2), in situ slightly extending back behind segment 3 (♂) or 2 (♀) when stretched dorsally; in length, antennomere 2 = 3 = 4 = 5 = 6 > 1 = 7 (Figs 1 & 2); interantennal isthmus about as broad as diameter of antennal socket (Fig. 2).

In width, collum = segment 3 = 4 < 2 < head = 5–16 (♂); thereafter body gradually tapering towards telson (Fig. 1). Tegument rather smooth and shining, prozonae shagreened, rear halves of metaterga mostly striolate; surface below paraterga microgranulate. Collum broadly and regularly rounded laterally. Postcollum paraterga rather well developed, mostly set low at about upper 1/3 of metazonae, only in segment 2 clearly rounded and drawn both anteriorly and posteriorly, following paraterga 3–18 acute-angled, pointed, beak-shaped and increasingly well produced behind caudal tergal margin, 19th somewhat reduced, but also acute and drawn well behind rear tergal margin; calluses narrow, demarcated by a complete, distinct, deep sulcus only dorsally and by a faint and incomplete one ventrally; poriferous calluses a little thicker than poreless ones; all postcollum calluses with a small, but evident, lateral tooth at anterior 1/3 (Figs 1 & 3).




Figs 7–9. SEM micrographs of right gonopod of *Tylopus brehieri* sp.n., ♂ holotype, mesal, dorsal and lateral views, respectively. Scale bars: 0.2 mm. Designations explained in text.

Рис. 7–9. SEM микрофотографии правого гонопода *Tylopus brehieri* sp.n., голотип ♂, соответственно изнутри, сверху и сбоку. Масштаб: 0,2 мм. Объяснения обозначений в тексте.

Ozopores lateral, placed inside an ovoid pit located at about rear ¼ of callus, traceable in dorsal view only due to a slightly sinuous poriferous callus (Fig. 3). Tergal setae largely abraded, pattern 2+2 in a transverse fore (= pre-sulcus) row; setae short, mostly ca ¼ as long as metazona. Transverse metatergal sulci thin, but deep, clearly beaded at bottom, nearly reaching bases of paraterga, faintly sinuate medially, present on metaterga 5–18 (Figs 1 & 3). Stricture dividing pro- and metazonae rather thin and deep, ribbed at bottom down to paraterga, striolate further ventrad. Axial line missing. Pleurosternal carinae evident arcuate ridges on segments 2–7, small bulges on segments 8–10, each with a small, but clearly visible caudal tooth. Epiproct (Figs 1 & 4) short, clearly flattened dorsoventrally, conical, deeply emarginate at apex, subapical lateral papillae very evident. Hypoproct (Fig. 5) nearly semicircular, caudal 1+1 setae well separated, not borne on knobs.

Sterna densely setose, cross-impressions weak, without modifications other than a prominent, setose, subquadrate lobe between ♂ coxae 4 (Fig. 6). Legs long, 1.7–1.8 (♂) or 1.3–1.4 times (♀) as long as midbody height, longer and crassate in ♂ compared to ♀, ♂ prefemora strongly swollen laterally; in length, femora > prefemora > tarsi > coxae = postfemora = tibiae (Fig. 2). All ♂ telopoditomeres with ventral brushes, the latter retained only on prefemora in caudal half of body.

Gonopods (Figs 7–9) complex; coxite about half as long as telopodite, subcylindrical, densely setose ventrolaterally; prefemoral (= densely setose) part of telopodite rather long, about 1/3 as long as acropodite and about as long as a stout, distally enlarged, erect and untwisted femorite. The latter with a distinct mesal groove/hollow (**g**) and a prominent, rounded, dorso-apical lobe (**m**), an even higher, rounded, apically wrinkled and denticulate, lateral lobe (**l**) partly delimited at base by a transverse sulcus, and a highly unequally bifid, spiniform, also transverse process (**z**). Solenophore (**sph**) clearly sigmoid, lamellar, expanded apically into a squarish lobe, almost fully sheathing a similarly long, flagelliform solenomere, with only its tip (**sl**) being exposed.

*Tylopus beroni* **sp.n.**

Figs 10–19.

HOLOTYPE ♂ (NMNHS), Laos, Khammouane Prov., 23 km NE of Thakaek, Ban Na, 24–30.01.2016, leg. P. Beron.




Figs 10–13. *Tylopus beroni* sp.n., ♂ holotype. 10 — habitus, lateral view; 11 — anterior part of body, ventral view; 12 — midbody segments, dorsal view; 13 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 10–13. *Tylopus beroni* sp.n., голотип ♂. 10 — общий вид, сбоку; 11 — передняя часть тела, снизу; 12 — среднетуловищные сегменты, сверху; 13 — задняя часть тела, сверху. Фотографии К. Макарова, сняты без масштаба.

DIAGNOSIS. Following the latest key to *Tylopus* spp. [Likhitrakarn et al., 2016], this new species keys out to couplet 5, but differs in showing a distinct sulcus basal to lobe **l** of the gonopod, also readily distinguished from congeners by the unique combination of a marked colour pattern, the presence of evident pleurosternal carinae on most of the body segments and in the shapes of the various gonopod structures.

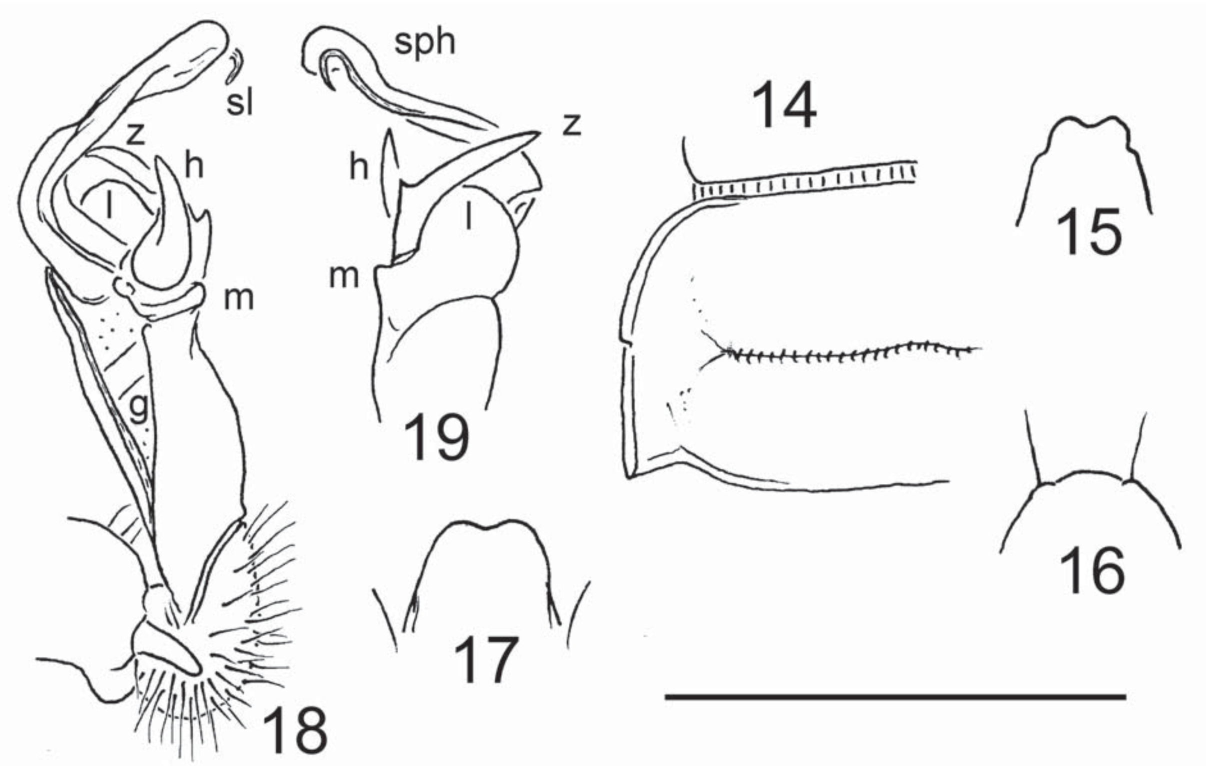
NAME. Honours Petar Beron (Sofia, Bulgaria), the collector.

DESCRIPTION. Length ca 28 mm, width of midbody pro- and metazonae 2.0 and 3.0 mm, respectively (♂). General coloration in alcohol dark brown to nearly blackish, with a contrasting pattern of light yellow-brown posterior halves of collum and following metaterga and much of their paraterga (Figs 10–13); venter, sides and legs somewhat lighter, brown.

All characters as in *T. brehieri* sp.n., except as follows.

Clypeolabral region densely setose, only a few setae between antennae, vertigial region with 1+1 setae in a transverse row. Antennomere 2 = 3 = 4 = 5 > 6 > 1 = 7.

In width, head < segment 3 = 4 < 2 < collum < 5–16 (♂); thereafter body gradually tapering towards telson (Fig. 11). Tegument rather smooth and shining, metaterga mostly striolate; surface below paraterga microgranulate. Postcollum paraterga rather well developed, mostly set low at about upper 1/3 of metazonae, only in segment 2 clearly rounded and drawn both anteriorly and posteriorly, following paraterga acute-angled, largely pointed or nearly so, beak-shaped and, starting with segment 15, increasingly well produced behind caudal tergal margin, 19th somewhat reduced, but also acute and drawn well behind rear tergal margin; calluses narrow, demarcated by a complete, distinct, deep sulcus only dorsally and by a fainter and often incomplete one ventrally; paraterga 2 with two, following ones with one small, but evident, lateral tooth at anterior 1/3 (Figs 12–14). Ozopores lateral, placed inside an ovoid pit located at about rear 1/3 of callus, traceable in dorsal view only due to a slightly sinuous poriferous callus (Figs 12 & 13). Tergal setae largely abraded, pattern 2+2 in a transverse fore (= pre-sulcus) row; setae short, mostly ca 1/4 as long as metazona. Transverse metatergal sulci thin, but deep, clearly beaded at bottom, faintly sinuate medially, incomplete (central) on metatergum 4, fully developed and reaching bases of paraterga on metaterga 5–18 (Figs 10, 12–14). Stricture dividing pro- and metazonae rather thin and deep, striated at bottom down to paraterga. Axial line thin,




Figs 14–19. *Tylopus beroni* sp.n., ♂ holotype. 14 — left half on metatergite 11, dorsal view; 15 — tip of epiproct, dorsal view; 16 — hypoproct, ventral view; 17 — sternal lobe between coxae 4, caudal view. Scale bar: 2.0 (14–17) and 1.0 mm (18, 19). Designations explained in text.

Рис. 14–19. *Tylopus beroni* sp.n., голотип ♂. 14 — левая половина метатергита 11, сверху; 15 — кончик эпипрокта, сверху; 16 — гипопрокт, снизу; 17 — стернальная пластинка между тазиками 4, сзади. Масштаб: 2.0 (14–17) и 1,0 мм (18, 19). Объяснения обозначений в тексте.

visible on both halves of postcollum metaterga. Pleurosternal carinae evident arcuate ridges on segments 2–7, a small ridge on segment 8, a small bulge on 2–3 following segments, each with a small, but clearly visible, increasingly reduced, caudal tooth, the latter traceable until segment 16. Epiproct (Figs 13 & 15) clearly emarginate at apex, subapical lateral papillae small. Hypoproct (Fig. 16) nearly semi-circular, caudal 1+1 setae well separated, borne on minute knobs.

Sterna densely setose, cross-impressions weak, without modifications other than a prominent, setose, subquadrate, slightly concave lobe between coxae 4 (Fig. 17). Legs long, 1.7–1.8 times as long as midbody height (♂), prefemora strongly swollen laterally; in length, femora > tarsi > prefemora = postfemora = tibiae > coxae (Fig. 10). All telopoditomeres rather densely setose ventrally, but without brushes. Starting with leg 9 and until two last leg-pairs, each postfemur and tibia with a small, but evident ventral tooth/tubercle at about proximal 1/3 (♂) (Figs 11–13).

Gonopods (Figs 18 & 19) complex; coxite nearly as long as femorite, setose ventrolaterally; prefemoral (= densely setose) part of telopodite rather short, about half as long as a stout, distally enlarged, erect and untwisted femorite. The latter with a distinct mesal groove/hollow (**g**) and a small dorso-apical lobe (**m**), a high, rounded, simple, lateral lobe (**l**) delimited at base by a transverse sulcus, a distinct, mesal, acuminate process (**h**) and a spiniform, subtransverse process (**z**) with a small, ventral, parabasal tooth. Solenophore (**sph**) sigmoid, lamellar, only slightly expanded apically into a rounded lobe, almost fully sheathing a similarly long, flagelliform solenomere, with only its tip (**sl**) being exposed.

REMARKS. The large Oriental genus *Tylopus* Jeekel, 1968, has recently been reviewed, with a key given to all of its 41 hitherto known constituent species [Likhitrakarn et al., 2016]. Neither of the above new congeners alters the generic diagnosis.

### *Desmoxytes simplex* **sp.n.**
Figs 20–24.

HOLOTYPE ♂ (NMNHS), Laos, Khammouane Prov., ca 65 km N of Thakaek, Cave Tham Nam Lod, 21.01.2016, leg. P. Beron.

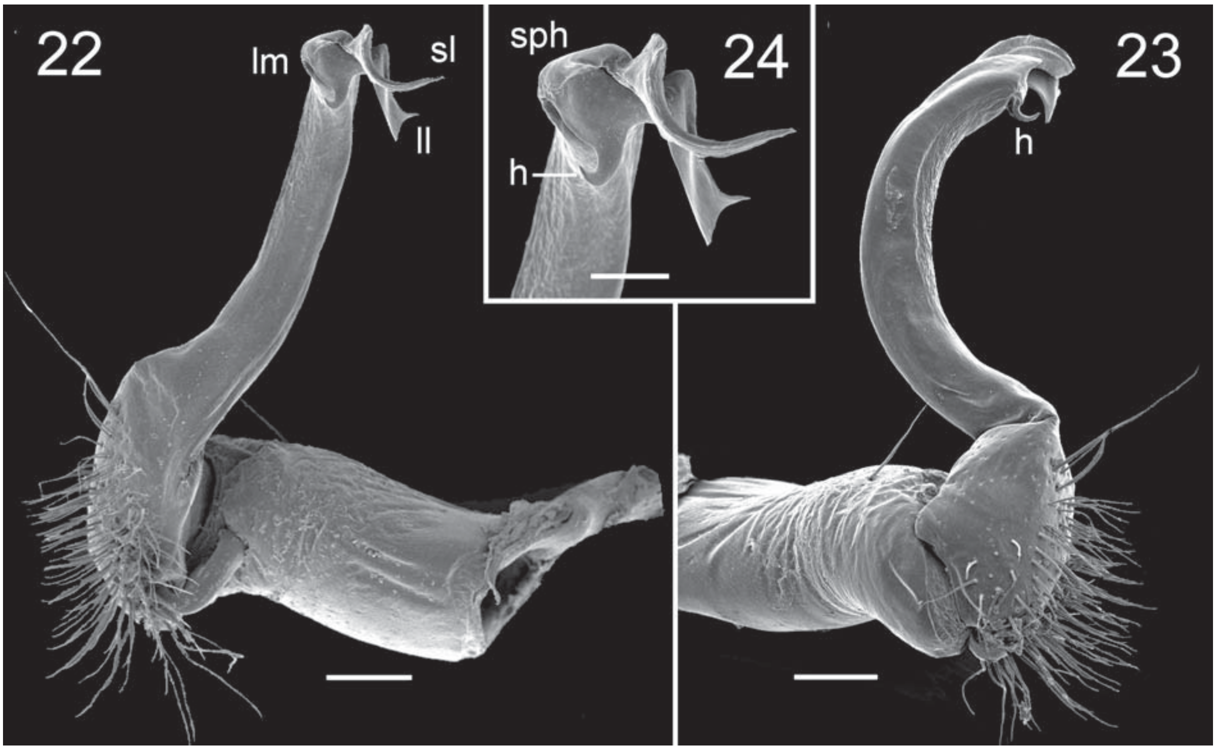
PARATYPES: 1 ♂, 1 ♀ (NMNHS), 1 ♀ (ZMUM ρ3477), same data, together with holotype.

DIAGNOSIS. Differs from other *Desmoxytes* species by the relatively simple, moderately well developed, wing-shaped paraterga, coupled with the smooth and poorly setose metaterga devoid of spines, the absence of adenostyles, the presence of a prominent simple central bulge between ♂ coxae 4, of a long, slen-




Figs 20–21. Habitus of *Desmoxytes simplex* sp.n., ♂ holotype, dorsal and ventral views, respectively. Pictures by J. Brecko.
Рис. 20–21. Общий вид *Desmoxytes simplex* sp.n., голотип ♂, соответственно сверху и снизу. Фотографии J. Brecko.

der, curved, distally not enlarged gonopod femorite and a highly condensed postfemoral region, the latter showing a characteristic basal hook on the lamella medialis. By the shape of the paraterga and the smooth, only poorly setose metaterga, the new species resembles *D. rubra* Golovatch et Enghoff, 1994, *D. pterygota* Golovatch et Enghoff, 1994, both from southern Thailand [Golovatch, Enghoff, 1994], and *D. laticollis* Liu, Golovatch et Tian, 2016, from a cave in southern China [Liu et al., 2016], but *D. simplex* sp.n. has no adenostyles (like *D. laticollis*), its gonofemorite is long, slender, not enlarged distad, while the lamella medalis




Figs 22–24. *Desmoxytes simplex* sp.n., ♂ paratype. 22, 23 — SEM micrographs of right gonopod, mesal and lateral views, respectively; 24 — SEM micrograph of right gonopod tip, mesal view. Scale bars: 0.1 (22, 23) and 0.05 mm (24). Designations explained in text.

Рис. 22–24. *Desmoxytes simplex* sp.n., паратип ♂. 22, 23 — SEM микрофотографии правого гоноподa, соответственно изнутри и сбоку; 24 — SEM микрофотография кончика правого гонопода. Масштаб: 0,1 (22, 23) и 0,05 мм (24). Объяснения обозначений в тексте.

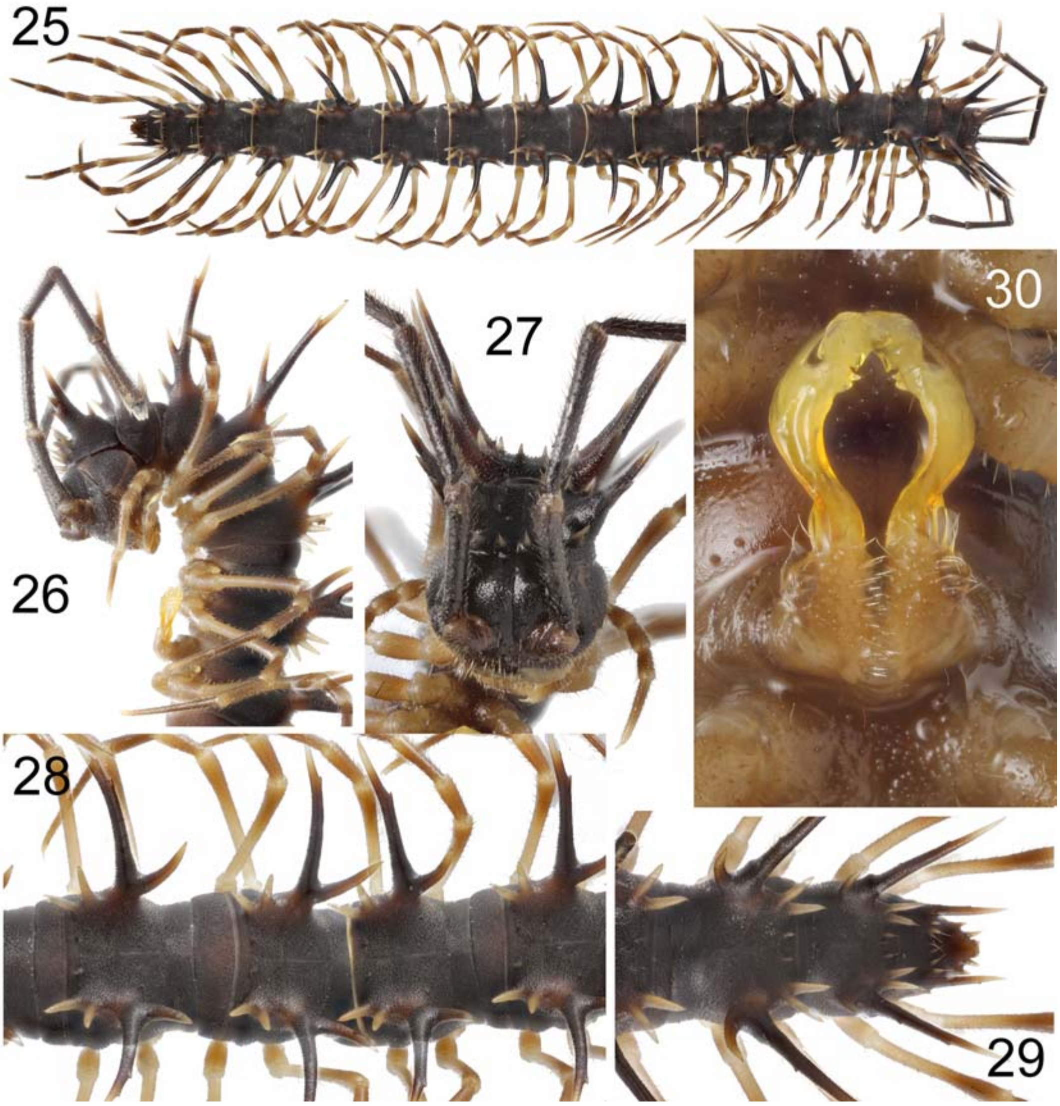
of the solenophore bears an evident basal hook (**h**, Figs 22–24), the two latter traits being apparently unique. The paraterga in *D. simplex* sp.n. also remind of those of *D. spectabilis* (Attems, 1937), from Vietnam, but in the latter species they are set much higher and are more strongly developed and differentiated, while the gonopods are considerably stouter [Likhitrakarn et al., 2015].

NAME. To emphasize the simple morphological traits such as wing-shaped paraterga and central bulge between ♂ coxae 4, coupled with smooth and poorly setose metaterga.

DESCRIPTION. Length ca 20–21 mm (♂, ♀), width of midbody pro- and metazonae 1.4 (♂) or 1.7 (♀) and 1.9 (♂) or 2.0 mm (♀), respectively. General coloration in alcohol very light brown to nearly pallid (Figs 20 & 21).

Entire head rather densely setose, only vertigial region less densely so; epicranial suture thin, superficial (Fig. 21). Antennae very long and slender, poorly clavate (Figs 20 & 21), in situ extending back behind segment 4 (♂) or 3 (♀) when stretched dorsally; in length, antennomere 3 = 4 = 5 > 2= 6 > 7 > 1 (Figs 20 & 21); interantennal isthmus about as broad as diameter of antennal socket (Fig. 21); antennomeres 5 and 6 each with a tight distodorsal group of bacilliform sensilla (Figs 20 & 21).

In width, segment 4 < collum = 3 = 5–18 < 2 < head (♂); body abruptly tapering on segment 19 and telson (Fig. 20). Tegument smooth and shining. Collum broadly and regularly rounded laterally. Postcollum paraterga rather well developed, set high at about upper 1/4–1/5 of metazonae, acute-angled, pointed, beak-shaped and well produced behind caudal tergal margin, 19th somewhat reduced, but also acute and drawn well behind rear tergal margin; calluses narrow, demarcated by a complete, distinct, deep sulcus only dorsally; poriferous calluses a little thicker in ozopore region than poreless ones; all postcollum calluses with two small, but evident, setigerous, lateral teeth, each separated by ca 1/3 paratergal length; paraterga 2–4 broadly and regularly rounded anterolaterally, each following paratergum with a small, but evident, shoulder-like, anterolateral lobule so that fore margin of these paraterga straight (Figs 20 & 21). Dorsum between paraterga nearly flat (♂) or slightly convex (♀), paraterga mostly distinctly (♂) or slightly (♀) upturned. Ozopores dorsolateral, placed inside an ovoid groove located behind 2nd lateral indentation (Fig. 20). Tergal setae largely abraded; collum with 6+6 setae along fore margin, 3+3 in a transverse middle row and 2+2 near caudal margin; apart from lateral marginal setae, following metaterga with a pattern of 2+2 and 3+3 setae in two trans-




Figs 25–30. *Desmoxytes grandis* sp.n., ♂ holotype. 25 — habitus, dorsal view; 26, 27 — anterior part of body, lateral and frontal views, respectively; 28 — midbody segments, dorsal view; 29 — posterior part of body, dorsal view; 30 — both gonopods in situ, ventral view. Pictures by K. Makarov, not taken to scale.

Рис. 24–30. *Desmoxytes grandis* sp.n., голотип ♂. 25 — общий вид, сверху; 26, 27 — передняя часть тела, соответственно сбоку и спереди; 28 — среднетуловищные сегменты, сверху; 29 — задняя часть тела, сверху; 30 — оба гонопода на месте, снизу. Фотографии К. Макарова, сняты без масштаба.

verse rows, one fore (= pre-sulcus), the other near caudal margin, both usually traceable at least due to minute insertion points. Tergal setae sharp, short, mostly ca 1/4–1/5 as long as metazona. Transverse metatergal sulci thin, but evident, smooth at bottom, reaching bases of paraterga, present on metaterga 5–18 (Fig. 20). Stricture dividing pro- and metazonae rather wide and deep, striolate at bottom down to paraterga. Axial line missing. Pleurosternal carinae well-developed, evident, microdenticulate ridges, each with a small, but distinct caudal tooth on segments of anterior body half, increasingly reduced towards segment 18 (♂) or 16 (♀). Epiproct long, slightly clavate, rounded at tip (Figs 20 & 21). Hypoproct (Fig. 21) semi-circular, caudal 1+1 setae well separated, not borne on knobs.

Sterna rather densely setose, cross-impressions evident, but axial groove weak; a small, but evident, rounded, sternal cone near each coxa (Fig. 21); a prominent, setose, oblong-oval bulge between ♂ coxae 4 (Fig. 21). Legs very long and slender, 2.0–2.1 (♂) or 1.7–1.8 times (♀) as long as midbody height, devoid of adenostyles, ♂ prefemora not swollen laterally; in length, femora >> tarsi > tibiae = prefemora > postfemora > coxae (Figs 20 & 21). Ventral brushes visible only on ♂ tarsi 1–4, thereafter gradually thinning out.

Gonopods (Figs 22–24) rather simple, slightly crossing each other medially; coxite almost as long as femorite, subcylindrical, with a single strong seta distoven-

trally; prefemoral (= densely setose) part of telopodite rather long, about half as long as femorite, the latter untwisted, clearly curved mesad, not enlarged distad, set off from a strongly condensed solenophore (**sph**) by a distinct cingulum. Lamina medialis (**lm**) of **sph** slightly shorter than an acuminate and bifid lamina lateralis (**ll**), with a small, but evident, basal hook (**h**). Solenomere short, placed between **lm** and **ll**, flagellifirm, its tip only slightly exposed beyond **sph**.

REMARKS. Due to the unpigmented body and very long antennae and legs, this species may well be regarded as a troglobiont, but this assumption requires verification. In general, *Desmoxytes* is a large Oriental genus, many species of which are presumed troglobites.

*Desmoxytes grandis* **sp.n.**

Figs 25–33.

HOLOTYPE ♂ (ZMUM ρ3478), Vietnam, Gia Lai Prov., Kon Chu Rang Nature Reserve, 14°30′54″N, 108°32′47″E, ca 1000 m a.s.l., mixed tropical forest, on wet logs near river, leaf litter, 05.2016, leg. I.I. Semenyuk.

PARATYPE: 1 ♀ (ZMUM ρ3479), same data, together with holotype.

DIAGNOSIS. Distinguished among *Desmoxytes* species by the largest body size (ca 38–40 mm long), coupled with antler-shaped paraterga, relatively stout gonopods with a strongly condensed solenophore.

NAME. To emphasize the largest body size among congeners.

DESCRIPTION. Length ca 38 (♂ holotype) or 40 mm (♀ paratype), width of midbody pro- and metazonae 2.4 (♂) or 2.7 (♀) and 2.8 (♂) or 3.0 mm (♀), respectively; distance between tips of midbody paraterga 6.5 (♂) or 7.0 mm (♀). General coloration in alcohol very dark chocolate brown; venter, tips of paraterga and tergal spines, and a few basal podomeres light grey to yellow-brown, distal podomeres and tip of epiproct light brown (Figs 25–29).

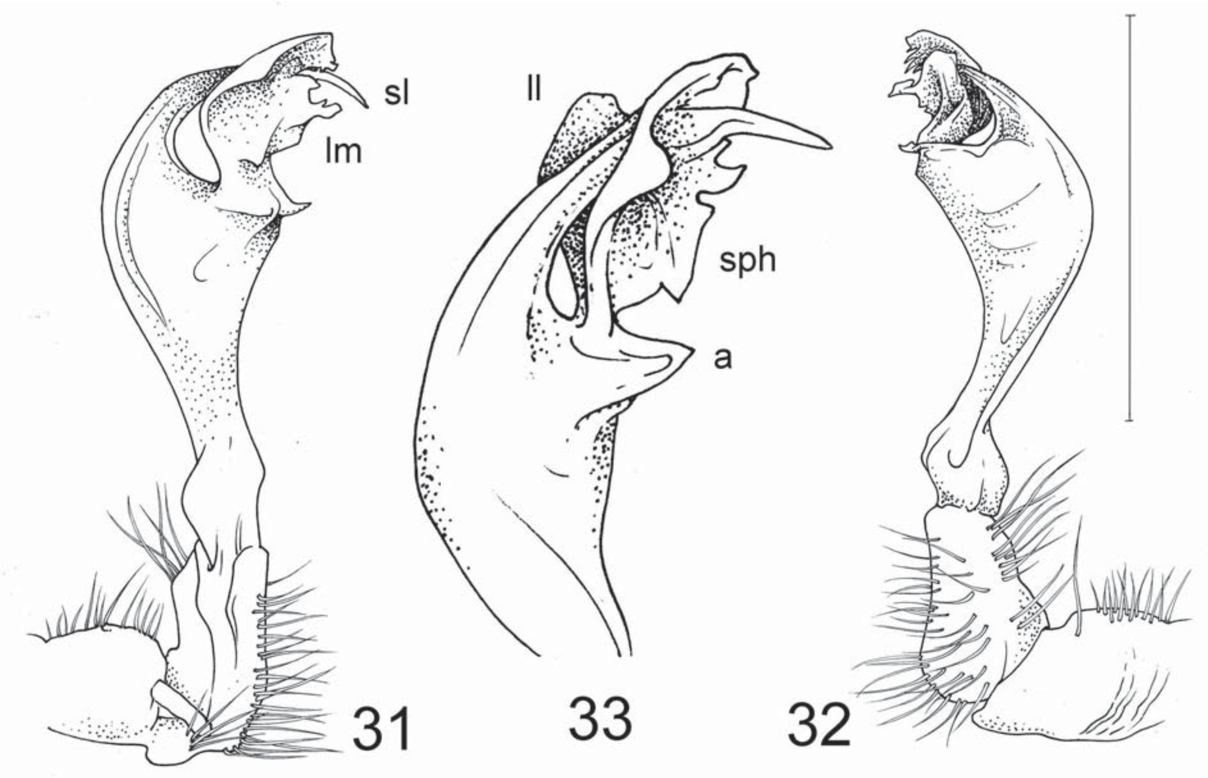
Clypeolabral region densely, vertigial region sparsely, setose; epicranial suture thin, but evident and quite deep (Fig. 27). Antennae very long and slender, only very poorly clavate (Figs 25–27), in situ extending back behind segment 5 (♂) or 4 (♀) when stretched dorsally; in length, antennomere 2 = 3 = 4 = 5 > 1 > 7 (Figs 25–27); interantennal isthmus almost as broad as diameter of antennal socket (Fig. 27).

Body strongly moniliform (Fig. 25). In width, collum < segment 2 = 3 < 4 < head = 5–17; thereafter body gradually tapering towards telson (Fig. 29). Tegument dull, prozonae and fore halves of strictures between pro- and metazona finely shagreened; head, metazonae, including paraterga and tergal spines, and rear halves of strictures clearly micrograpulate to microspiculate. Collum subquadrate, its paraterga strong lateral spines with two smaller, anterior, spiniform branchlets near midway; 3+3 small spines along fore margin, another 3+3 similar spines at caudal margin, and 1+1 minute paramedian spinules between dorsolaterally directed, nearly straight paraterga (Figs 26 & 27). Postcollum paraterga increasingly high until segment 4, also directed dorsolaterally and slightly curved, each with one strong, somewhat curved, anterior spine parabasally and a small spinicle distally; starting with segment 9, paraterga increasingly well inclined caudad as well, those on segment 19 being already straight, directed caudally and held parallel to main axis; poriferous paraterga with a small subapical incision bearing underneath an inconspicuous ozopore on lateral side. Each postcollum metatergum with 1+1, 1+2, 2+1, 2+2 or up to 3+3 minute, barely visible knobs between paraterga (their number gradually growing towards telson), as well as with a paramedian pair of small, but evident knobs or spinules at caudal margin; usually 2+2, occasionally 3+2, 2+3 or 3+3 spines also behind paraterga (Figs 25–29). Tergal setae wanting. Transverse metatergal sulcus almost wanting on segment 4, very faint, but reaching bases of paraterga on metaterga 5–18 (Figs 28 & 29). Stricture dividing pro- and metazonae wide and shallow. Axial line nearly missing, usually traceable on both halves of metaterga. Pleurosternal carinae evident, on segments 2 and 3 small simple ridges, on collum a thin ridge tightly appressed to gena, on segment 4 a small bulge, thereafter missing. Epiproct long, flattened dorsoventrally, tip subtriangular; subapical lateral papillae clearly digitiform stalks (Fig. 29). Hypoproct (Fig. 21) semi-circular, caudal 1+1 setae well separated, borne on similar stalks.

Sterna sparsely setose, cross-impressions very faint, axial groove especially weak; a small, rounded, sternal cone near each coxa; a paramedian pair of small, setose, separated tubercles between ♂ coxae 4. Spiracles small stalks. Legs very long and slender, distinctly longer in ♂ than in ♀, but 1.2–1.3 times as long as midbody height together with paraterga both in ♂ and ♀, because paraterga proportionately shorter in ♀ compared to ♂. Adenostyles missing, ♂ prefemora normal, not swollen laterally; in length, femora >> tarsi >> tibiae > prefemora = postfemora > coxae (Figs 20 & 21). Ventral brushes absent.

Gonopods (Figs 30–33) rather simple, in touch with each other apically; coxite about as long as femorite, subcylindrical, strongly setose ventrally; prefemoral (= densely setose) part of telopodite also about as long as femorite, the latter untwisted, stout, curved mesad, very considerably enlarged distad, set off from a strongly condensed solenophore (**sph**) by a distinct cingulum, expanded ventro-apically into a distinct outgrowth (**a**) at **sph** base. Lamina medialis (**lm**) of **sph** slightly higher than lamina lateralis (**ll**), both irregularly shaped. Solenomere short, placed between **lm** and **ll**, flagelliform, its tip only slightly exposed beyond **sph**.

REMARKS. At the moment, this is the largest species of *Desmoxytes*, the previous record (ca 35 mm long) being *D. gigas* Golovatch et Enghoff, 1994, from southern Thailand [Golovatch, Enghoff, 1994].




Figs 31–33. *Desmoxytes grandis* sp.n., ♂ holotype. 31 & 32 — left gonopod, mesal and lateral views, respectively; 33 — distal half of left gonopod, mesal view. Scale bar: 1.0 mm (31, 32), not to scale (33). Designations explained in text.

Рис. 31–33. *Desmoxytes grandis* sp.n., голотип ♂. 31 и 32 — левый гопопод, соответственно изнутри и сбоку; 33 — дистальная половина левого гонопода, изнутри. Масштаб: 1,0 мм (31, 32), без масштаба (33). Объяснения обозначений в тексте.

*Anoplodesmus mirabilis* **sp.n.**
Figs 34–42.

HOLOTYPE ♂ (ZMUM ρ3480), Vietnam, Gia Lai Prov., Kon Ka Kinh National Park, 14°14′17″N, 108°19′07″E, 800 m. a.s.l., mixed tropical forest, leaf litter, 05.2016, leg. I.I. Semenyuk.

PARATYPES: 4 ♂♂, 1 ♀ (ZMUM ρ3481), same data, together with holotype.

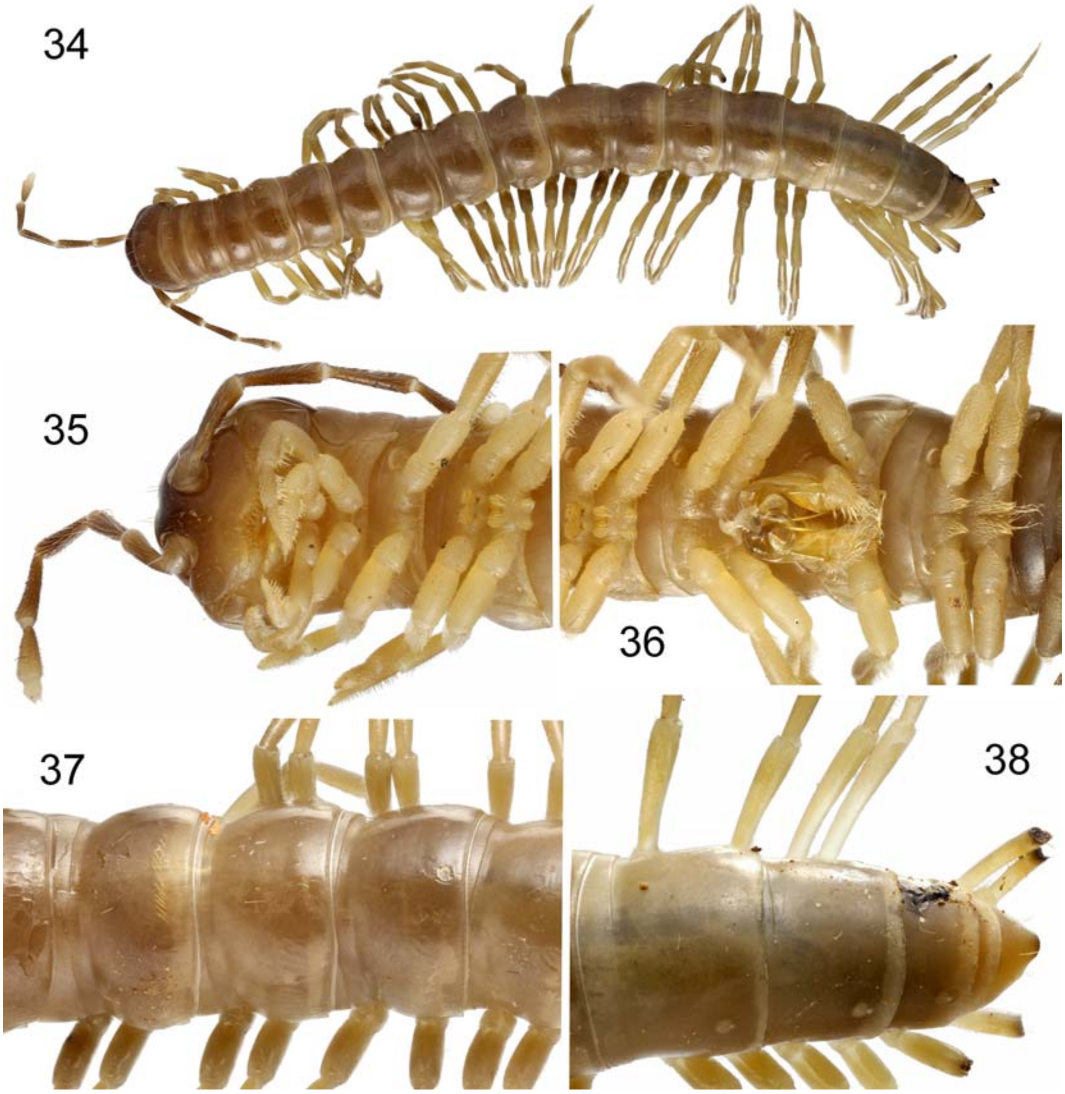
DIAGNOSIS. Differs from other *Anoplodesmus* species with wanting paraterga, coniferous sterna, and especially long solenomeres and complex solenophores primarily by the extremely elaborate shape of the solenophore which lacks spines (Figs 39–42).

NAME. To emphasize the remarkably complex solenophore.

DESCRIPTION. Length ca 28–30 mm (♂, ♀), width of midbody pro- and metazonae 2.5–2.7 and 2.8–3.0 (♂) or 3.0 and 3.3 mm (♀), respectively. Holotype ca 28 mm long, 2.5 and 2.8 mm wide on midbody pro- and metazonae, respectively. General coloration in alcohol uniformly grey-brown to dark brown; sides, ozopore regions, genae, sides of telson, 2–3 distalmost podomeres, sometimes also calluses of pleurosternal carinae slightly lighter, brown; venter and several basal podomeres considerably lighter, grey-yellowish (Figs 34–38).

Clypeolabral region densely, vertigial region sparsely, setose; epicranial suture thin, superficial. Antennae long and slender, slightly clavate (Figs 34 & 35), in situ extending back behind segment 4 (♂) or 3 (♀) when stretched dorsally; in length, antennomere 2 = 3 = 4 > 5 > 6 > 7 = 1 (Figs 34 & 35); interantennal isthmus about as broad as diameter of antennal socket (Fig. 35).

Body subcylindrical (Fig. 34). In width, segment 3 = 4 < 2 = head < collum = 5–14 (♂); thereafter body very gradually tapering towards telson (Figs 34, 37 & 38). Tegument generally smooth and shining, only metazonae in places finely striolate in rear halves and laterally. Collum broadly and regularly rounded laterally, with 6+6 setae along fore margin, 2+2 in middle row and 3+3 at caudal margin. Paraterga totally wanting, their positions traced through inconspicuous round ozopores lying at about 1/3 of midbody height below dorsum and of metazonital length in front of caudal margin. Neither transverse sulci nor axial line. Tergal setae simple, sharp, medium-sized, ca 1/4–1/5 as long as metazona, setation pattern on postcollum segments usually 2+2, 3+3 only on segment 17, arranged in a transverse anterior row. Pleurosternal carinae very distinct ridges with a rounded caudal lobule or tooth on segments 2–16, a still traceable stria on segments 17 and 18, absent from 19th (Figs 34–38), a little smaller in ♀ compared to ♂. Stricture between pro- and metazona broad and shallow, smooth at bottom. Epiproct long,



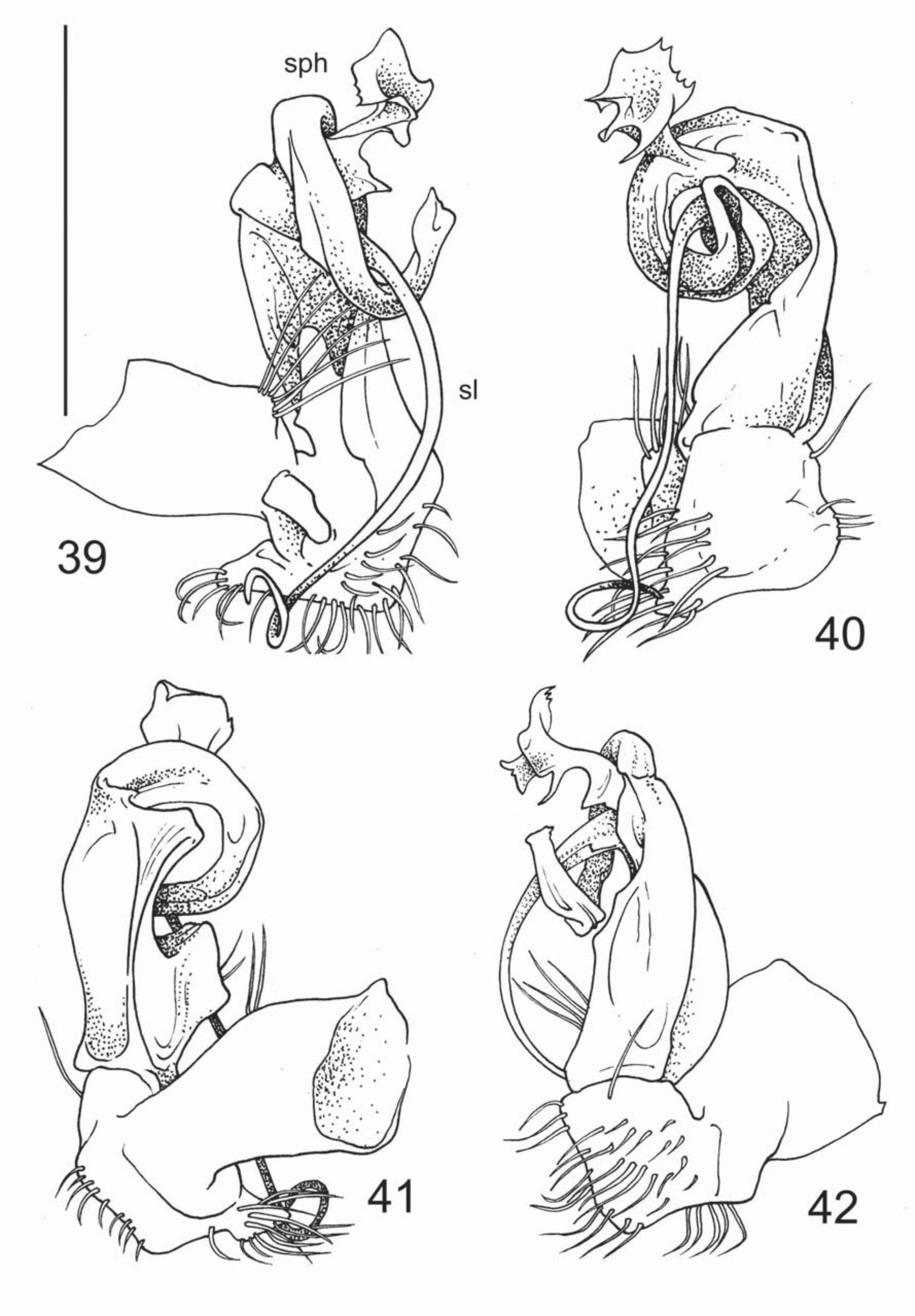

Figs 34–38. *Anoplodesmus mirabilis* sp.n., ♂ holotype. 34 — habitus, dorsal view; 35 — anterior part of body, ventral view; 36 — segments 5–8, ventral view; 37 — midbody segments, dorsal view; 38 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 34–38. *Anoplodesmus mirabilis* sp.n., голотип ♂. 34 — общий вид, сверху; 35 — передняя часть тела, снизу; 36 — сегменты 5–8, снизу; 37 — среднетуловищные сегменты, сверху; 38 — задняя часть тела, сверху. Фотографии К. Макарова, сняты без масштаба.

very narrowly truncate at a slender tip, subapical lateral papillae small. Hypoproct roundly subtriangular, 1+1 setae at caudal margin lying quite close to each other and borne on minute knobs.

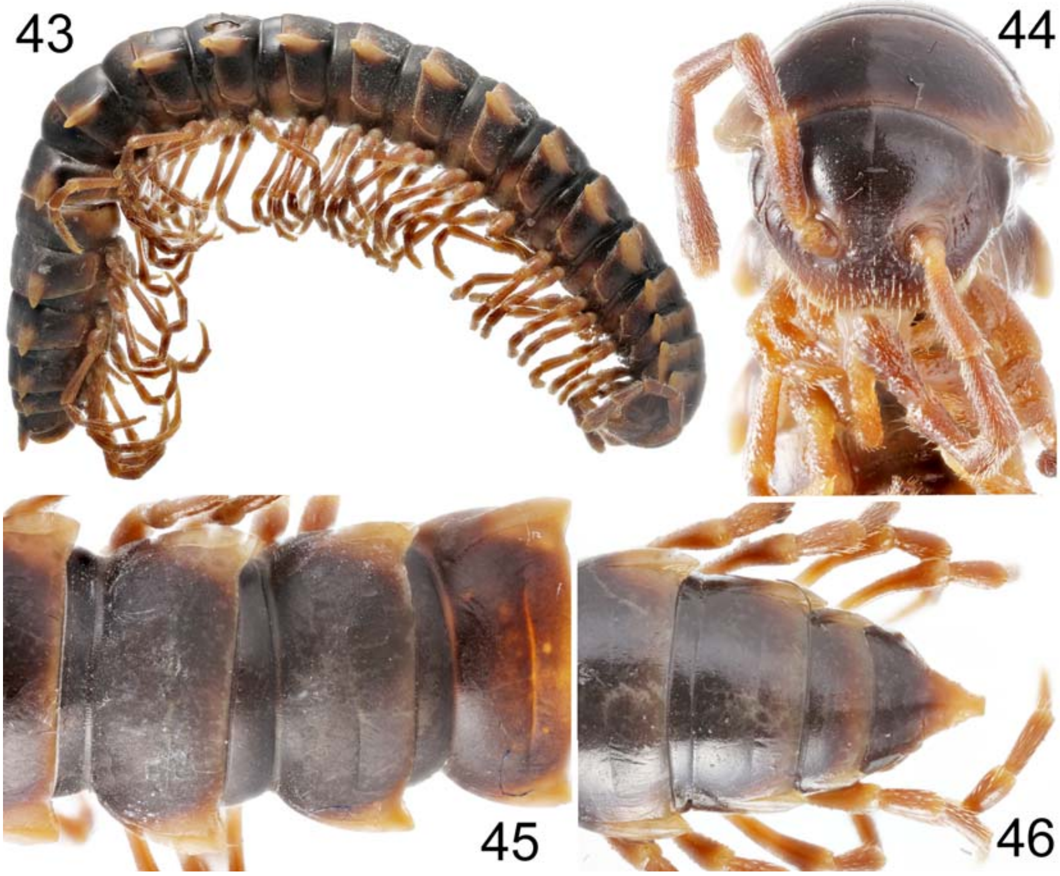
Sterna mostly rather sparsely setose, cross-impressions evident, but axial groove weaker; an evident, rounded, sternal cone near each coxa, each anterior pair being smaller than each posterior one (Figs 35 & 36); a prominent, setose, apicomedially slightly notched, subquadrate lobe between ♂ coxae 4; 2+2 densely setose sternal cones between ♂ coxae 5, anterior pair being directed unusually forward (Fig. 35). Legs very long and slender, ca 2.0–2.1 (♂) or 1.7–1.8 times (♀) as long as midbody height, distinctly increasingly long towards telson, devoid of adenostyles, ♂ prefemora clearly bulged laterally; in length, femora > postfemora = tibiae = tarsi > prefemora > coxae (Fig. 34). All ♂ podomeres densely setose ventrally, all telopoditomeres with ventral brushes until about midbody legs, but thinning out on femora towards posterior body half.

Gonopods (Figs 36, 39–42) highly complex, slightly crossing each other medially; coxite about as long as femorite, subcylindrical, poorly setose distoventrally; prefemoral (= densely setose) part of telopodite rather short, about 2/3 as long as femorite, the latter untwisted, curved mesad, with an evident medial groove, not enlarged distad, set off from a strongly coiled, lamellar, irregularly shaped and extremely complex solenophore




Figs 39–42. Left gonopod of *Anoplodesmus mirabilis* sp.n., ♂ paratype, mesal, ventral, dorsal and lateral views, respectively. Scale bar: 1.0 mm. Designations explained in text.

Рис. 39–42. Левый гонопод *Anoplodesmus mirabilis* sp.n., паратип ♂, соответственно изнутри, снизу, сверху и сбоку. Масштаб: 1,0 мм. Объяснения обозначений в тексте.




Figs 43–46. *Enghoffosoma contrastum* sp.n., ♂ paratype, 43 — habitus, lateral view; 44 — anterior part of body, ventral view; 45 — midbody segments, dorsal view; 46 — posterior part of body, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 43–46. *Enghoffosoma contrastum* sp.n., паратип ♂. 43 — общий вид, сверху; 44 — передняя часть тела, снизу; 45 — среднетуловищные сегменты, сверху; 46 — задняя часть тела, сверху. Фотографии К. Макарова, сняты без масштаба.

(**sph**) by a distinct cingulum. Solenomere (**sl**) flagelliform, extremely long, much longer than entire gonopod, mostly exposed beyond **sph**.

REMARKS. *Anoplodesmus* Pocock, 1896 is a large Oriental genus (> 30 described species) which contains two large groups of species. One contains large-bodied species (> 40 mm long) with strongly developed paraterga and simple gonopods, the other smaller species (< 35 mm long) with strongly reduced paraterga and more to highly elaborate gonopods [Golovatch, 2000]. The latter group includes a subgroup of species, in which the solenomere is particularly long, strongly exposed beyond the solenophore tip and often much longer than the gonopod telopodite: *A. elongissimus* (Golovatch, 1984), from the Hinalayas of India, *A. perplexus* (Golovatch, 1993), from southern Thailand, *A. spiniger* Chen, Golovatch, Mikhajlova et Chang, 2010*, A. aspinosus* Chen, Golovatch, Mikhajlova et Chang, 2010, both from Taiwan, *A. anichkini* Golovatch et Semenyuk, 2010, *A. borealis* Nguyen, 2010 and *A. solenophorus* Nguyen, 2010, all three from Vietnam [Nguyen, 2010]. The new species is distinguished from those seven congeners by the characteristic shape of a highly elaborate solenophore which is devoid of spines, coupled with an extremely long solenomere (Figs 36, 39–42).

*Enghoffosoma contrastum* **sp.n.**
Figs 43–51.

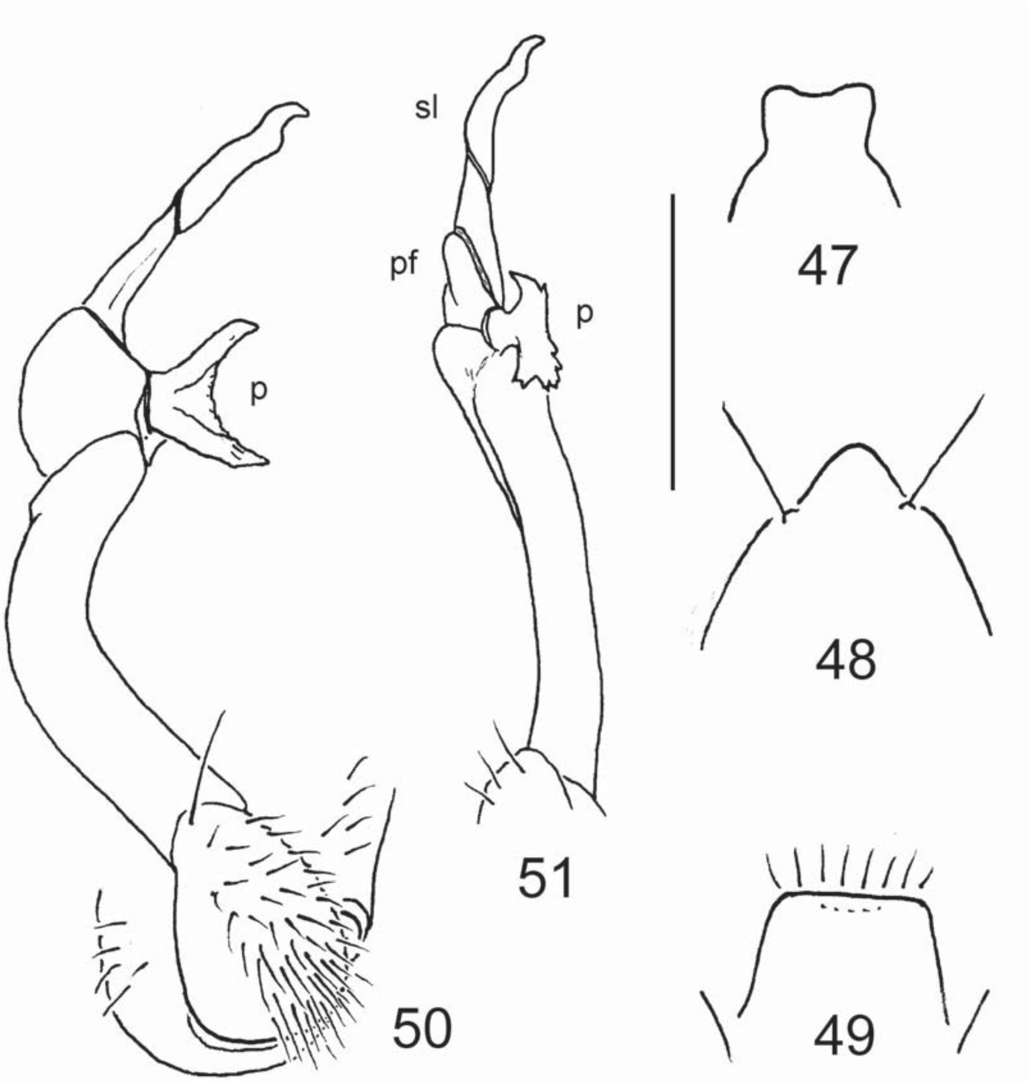
HOLOTYPE ♂ (ZMUM ρ3482), Vietnam, Nha Trang, X.1985, leg. L. Nezlin.

PARATYPES: 1 ♂, 1 juv. (ZMUM ρ3483), same data, together with holotype.

DIAGNOSIS. Differs from other *Enghoffosoma* spp. by the remarkable colour pattern, combined with the characteristically large, single, ventromesal, bifid process (**p**) at the base of the gonopod postfemoral region (**pf**) (Figs 50 & 51).

NAME. To emphasize the rather clearly contrasting colour pattern.

DESCRIPTION. Length of both ♂♂ ca 35 mm, width of midbody pro- and metazonae 3.0 and 4.2 mm, respectively. General coloration in alcohol uniformly dark chocolate brown, but, starting with collum, paraterga together with caudal trianglular metatergal spots adjacent to paraterga, as well as epiproct rather contrasting light yellow to yellow-brown; antennae, venter




Figs 47–51. *Enghoffosoma contrastum* sp.n., ♂ paratype, 47 — tip of epiproct, dorsal view; 48 — hypoproct, ventral view; 49 — sternal lobe between coxae 4, caudal view; 50 & 51 — right gonopod, ventral and mesal views, respectively. Scale bar: 0.2 mm. Designations explained in text.

Рис. 47–51. *Enghoffosoma contrastum* sp.n., паратип ♂. 47 — кончик эпипрокта, сверху; 48 — гипопрокт, снизу; 49 — стернальная пластина между тазиками 4, сзади; 50 и 51 — правый гонопод, соответственно снизу и изнутри. Масштаб: 0,2 мм. Объяснения обозначений в тексте.

and legs lighter brown to red-brown (Figs 43–46). Paratype juvenile uniformly greyish.

Clypeolabral region densely setose, a few setae between and above antennae; epicranial suture thin, superficial (Fig. 44). Antennae moderately long and slender, slightly clavate (Figs 43 & 44), in situ extending back behind until about midway of segment 3 (♂) when stretched dorsally; in length, antennomere 2 > 4 = 5 = 6 > 1 > 7 (Fig. 44); interantennal isthmus about as broad as diameter of antennal socket (Fig. 44).

In width, head < segment 3 = 4 < 2 < collum = 5–16; thereafter body gradually tapering towards telson (Figs 44–46). Tegument generally smooth and poorly shining, nearly dull, only rear halves of metazonae and sides below paraterga in places finely striolate. Collum broadly and regularly rounded laterally, with a large rounded lobe faintly produced behind caudal margin. Tergal setae fully abraded, pattern untraceable. Postcollum paraterga moderately developed, set rather high, at about upper 1/3 of midbody metazonital height, their fore margin slightly produced forward and rounded only in segment 2, thereafter invariably strongly and regularly rounded; caudal corner of all postcollum paraterga always acute, triangular, drawn behind rear tergal margin, pointed to nearly pointed, increasingly long until segment 17, but clearly reduced in segments 18 and 19. Paraterga demarcated by a deep and complete sulcus only dorsally, calluses thicker and slightly sinuous near ozopores in bore-bearing segments, invariably smooth at lateral margin (Figs 45 & 46). Ozopores lateral, each placed inside a small round pit at ca 1/5 metazonital length off caudal corner. Transverse




Figs 52–54. *Beronodesmus martensi* sp.n., ♂ paratype. 52 — habitus, lateral view; 53 — anterior and posterior parts of body, dorsal view; 54 — midbody segments, dorsal view. Pictures by K. Makarov, not taken to scale.

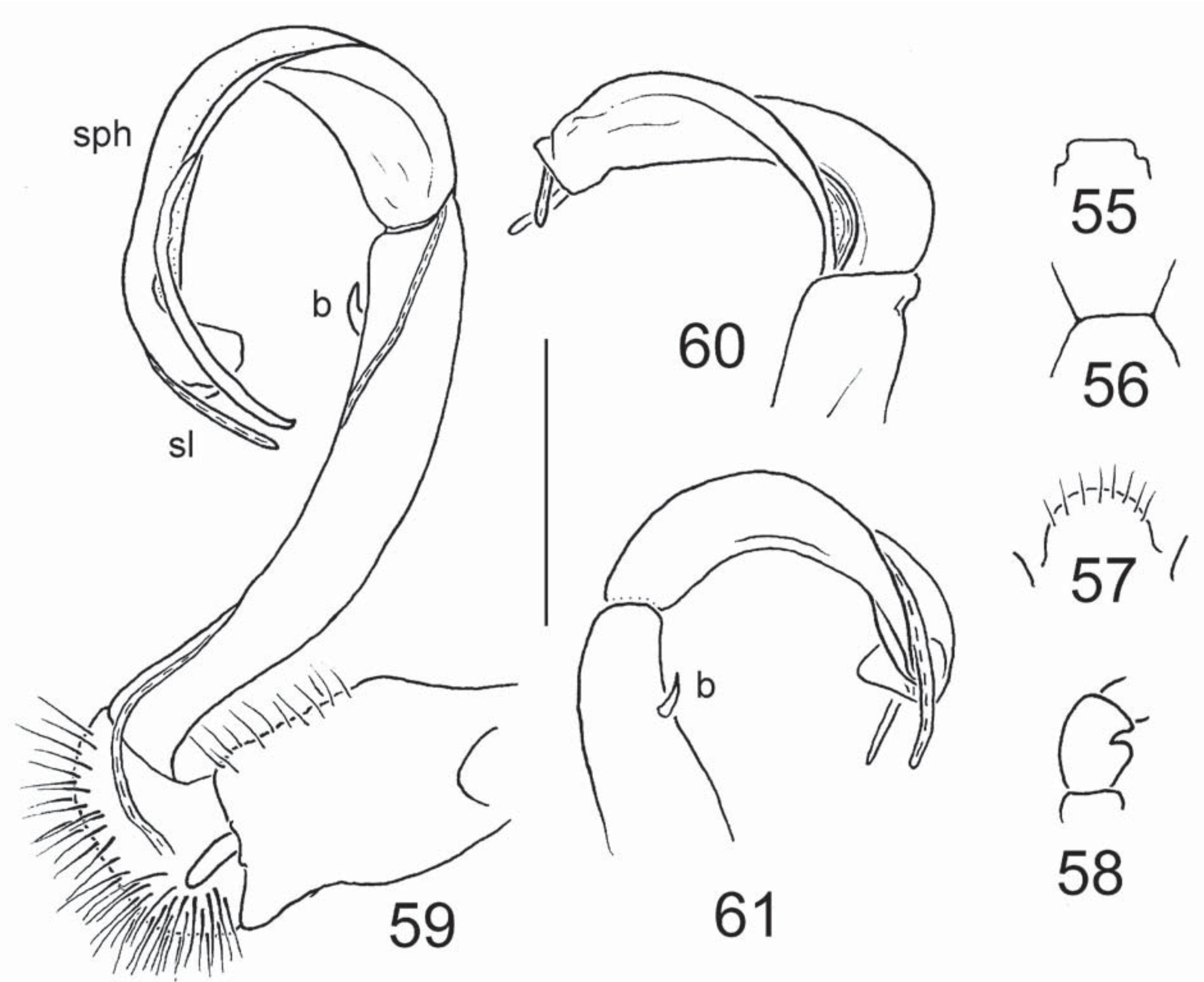
Рис. 52–54. *Beronodesmus martensi* sp.n., паратип ♂. 52 — общий вид, сбоку; 53 — передняя и задняя части тела, сверху; 54 — среднетуловищные сегменты, сверху. Фотографии К. Макарова, сняты без масштаба.

sulci superficial, not reaching bases of paraterga, present on metaterga 5–18, sometimes barely punctate at bottom. Axial line missing. Pleurosternal carinae distinct ridges with a rounded caudal tooth, increasingly reduced on segments 2–17 (Fig. 43). Stricture between pro- and metazona thin and deep, nearly smooth at bottom, sometimes very finely striolate mid-dorsally. Epiproct long, very narrowly concave at a slender tip, subapical lateral papillae small (Figs 46 & 47). Hypoproct (Fig. 48) semi-circular, 1+1 setae at caudal margin lying quite close to each other, borne on minute knobs, very slightly removed from caudal margin.

Sterna densely setose, cross-impressions faint; a small, rounded, vestigial cone near each posterior coxa (♂); a prominent, high, setose, subquadrate lobe between ♂ coxae 4 (Fig. 49). Legs long and slender, densely setose, apparently somewhat incrassate as compared to ♀, ca 1.5–1.6 times as long as midbody height (♂), devoid of adenostyles, ♂ prefemora clearly bulged laterally, tarsal brushes visible until legs of ♂ segment 15; in length, femora > tibiae > tarsi > prefemora = postfemora > coxae.

Gonopods (Figs 50 & 51) rather complex, slightly crossing each other medially; coxite almost as long as femorite, subcylindrical, densely setose ventrally; prefemoral (= densely setose) part of telopodite short, about half as long as femorite, the latter untwisted, clearly curved mesad, not enlarged distad, set off from a strongly coiled acropodite by a distinct cingulum. Solenomere (**sl**) thick, twisted, suberect, long, about as long as femorite; basalmost coil of **sl** forming a slightly enlarged postfemoral region (**pf**), the latter carrying a single, large, conspicuous, bifid, irregularly shaped, ventromesal process (**p**).

REMARKS. *Enghoffosoma* Golovatch, 1993, is a fairly large genus which encompasses 11 described species ranging from southern China in the north, western Myanmar in the west, central Thailand in the south, and Vietnam in the east [Likhitrakarn et al., 2014; Nguyen, Golovatch, 2016]. The 12th, new species is remarkable not only in a vivid colour pattern (shared with several congeners), but in process **p** located at the base of the gonopod postfemoral region being single (Figs 50 & 51). This part of the gonopod in *Enghoffosoma* is usually equipped with two separate processes, designated by Likhitrakarn et al. [2014] as a more distal **e** and a basal **p**. Only sometimes is **p** totally suppressed (e.g. in *E. bispinum* Likhitrakarn, Golovatch et Panha, 2014, *E. fedorenkoi* (Golovatch, 2016), *E. triangulare* Nguyen et Golovatch, 2016 or *E. digi-*




Figs 55–61. *Beronodesmus martensi* sp.n., ♂ paratype. 55 — tip of epiproct, dorsal view; 56 — hypoproct, ventral view; 57 — sternal lobe between coxae 4, caudal view; 58 — femur 1, lateral view; 59–61 — right gonopod, mesal, dorsal and lateral views, respectively. Scale bar: 1.0 (55–58) and 0.5 mm (59–61). Designations explained in text.

Рис. 55–61. *Beronodesmus martensi* sp.n., паратип ♂. 55 — кончик эпипрокта, сверху; 56 — гипопрокт, снизу; 57 — стернальная пластина между тазиками 4, сзади; 58 — бедро 1, сбоку; 59–61 — правый гонопод, соответственно изнутри, сверху и сбоку. Масштаб: 1,0 (55–58) и 0,5 мм (59–61). Объяснения обозначений в тексте.

*tatum* Nguyen et Golovatch, 2016). Looking at **p** in *E. contrastum* sp.n. attentively, especially its division into its two branches becoming one only at the base, one cannot exclude that **p** here is the result of fusion of the initial **e** and **p**.

*Beronodesmus martensi* **sp.n.**
Figs 52–61.

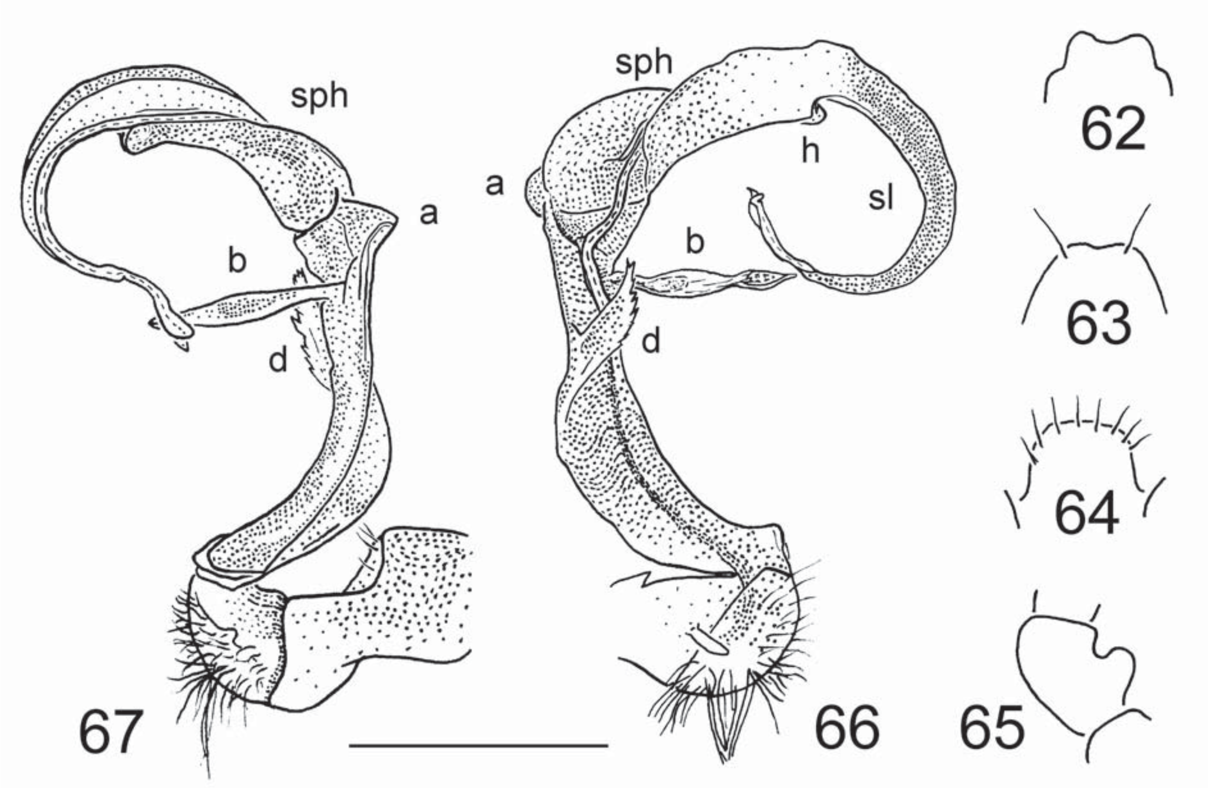
HOLOTYPE ♂ (SMF), Nepal, Mustang Distr., Thakkhola, Kali Gandaki Valley between Annapurna and Dhaulagiri Himal, Chadziou Khola Valley near Lethe and Ghasa, mixed broadleaved forest with rich bush, herb and bamboo understorey, 2650 m a.s.l., 28.VI.–3.VII.1970, leg. J. Martens.

PARATYPES: 3 ♂♂ (SMF), 1 ♂ (ZMUM ρ3484), same data, together with holotype.

DIAGNOSIS. This new species seems to be particularly similar to *B. gorkhalis* Golovatch, 2015, especially as regards the shared body size (♂ width ca 1.0–1.1 mm), several peripheral (a truncate epiproct tip, ribbed strictures etc.) and gonopodal characters (an elaborate solenophore tip, the presence of only a single, relatively small, distofemoral spine and the absence of an outgrowth more or less opposite that spine). The main differences (cf. Figs 71 & 72) concern a much smaller peg (**b**) in the distofemoral part of the gonopod and a simpler tip of its solenophore (Figs 59–61) in *B. martensi* sp.n., coupled with the head being wider vs narrower than following body segments, a trapeziform vs semi-circular hypoproct, considerably longer legs (1.5–1.6 vs 1.0–1.1 as long as ♂ midbody height) etc. [Golovatch, 2015].

NAME. To honour Jochen Martens, the collector.

DESCRIPTION. Length ca 10–11 mm, width of midbody pro- and metazonae 0.8–0.9 and 1.0–1.1 mm, respectively (♂). Holotype ca 10 mm long, 0.8 and 1.0 mm wide on midbody segments, respectively. Coloration in alcohol uniformly light grey-yellowish to nearly pallid (Figs 52–54).




Figs 62–67. *Beronodesmus serratus* sp.n., ♂ holotype. 62 — tip of epiproct, dorsal view; 63 — hypoproct, ventral view; 64 — sternal lobe between coxae 4, caudal view; 65 — femur 1, lateral view; 66, 67 — left gonopod, mesal and lateral views, respectively. Scale bar: 1.0 mm. Designations explained in text.

Рис. 62–67. *Beronodesmus serratus* sp.n., голотип ♂. 62 — кончик эпипрокта, сверху; 63 — гипопрокт, снизу; 64 — стернальная пластина между тазиками 4, сзади; 65 — бедро 1, сбоку; 66, 67 — левый гонопод, соответственно изнутри и сбоку. Масштаб: 1,0 мм. Объяснения обозначений в тексте.

Head nearly entirely densely setose, only occipital region bare; epicranial suture thin, superficial (Fig. 53). Antennae rather short and clavate, in situ slightly extending back behind segment 2 when stretched dorsally (♂); in length, antennomere 2 = 3 = 6 > 4 > 5 > 1 > 7; interantennal isthmus about half as broad as diameter of antennal socket.

Body submoniliform (Figs 52–54). In width, segment 3 = 4 < collum = 2 = 5–16 < head; caudal part of body gradually tapering towards telson (Fig. 53). Tegument smooth and shining, finely shagreened, metazonae only in places and faintly striolate. Collum broadly and regularly rounded laterally, with three transverse rows of setae. Postcollum paraterga very poorly-developed, set low, at about half of metazonital height, small ridges only on segment 2, thereafter traceable only due to vague, incomplete, dorsal sulci (Figs 52–54). Ozopores lateral, placed inside an ovoid pit located mostly at about rear 1/4 of metazonital length and at about half of metazonital height. Tergal setae largely abraded, pattern very poorly traceable due to insertion points, probably 2+2 and 2+2 in two transverse rows, one fore, the other rear; setae rather long, simple, ca 1/3–1/4 as long as metazona. Transverse metatergal sulci and axial line missing (Figs 52–54). Stricture dividing pro- and metazonae rather thin and deep, clearly ribbed at bottom down to ozopore level (Fig. 54). Pleurosternal carinae very low lappets only on segment 2. thereafter missing. Epiproct (Figs 53 & 55) short, clearly flattened dorsoventrally, conical, truncate at apex, subapical lateral papillae poorly-developed. Hypoproct (Fig. 56) trapeziform, caudal 1+1 setae well separated, not borne on knobs.

Sterna densely setose, cross-impressions weak, without modifications other than a prominent, setose, rounded lobe between coxae 4 (Fig. 57). Legs medium-sized, apparently stouter and longer in ♂, 1.5–1.6 times as long as midbody height (♂); prefemora clearly swollen laterally; in length, femora = tarsi > prefemora > postfemora = tibiae > coxae (Fig. 52). Tarsal brushes gradually thinning out towards caudal 1/3 body. Ventral parabasal adenostyles on femora 1 prominent (Fig. 58).

Gonopods (Figs 59–61) relatively simple; coxite subcylindrical, setose ventrally, ca 1/3 as long as a subgeniculate acropodite; prefemoral (= densely setose) part of telopodite short, about 1/3 as long as a slender, distally not enlarged, simple, ribbon-shaped, untwisted and mesad slightly curved femorite, the latter with a small, but evident distoventral peg (**b**). Distal 1/3 of telopodite strongly curved anteromesad, nearly circular, solenophore (**sph**) demarcated from femorite

by a transverse cingulum; solenomere (**sl**) flagelliform, as long as an apically acuminate **sph**.

*Beronodesmus serratus* **sp.n.**
Figs 62–67.

HOLOTYPE ♂ (SMF), Nepal, Taplejung District, pasture Lasetham NW of Yamputhin, 3300–3500 m a.s.l., mature *Abies-Rhododendron* forest, 6–9.V.1988, leg. J. Martens & W. Schawaller.

DIAGNOSIS. Distinguished from all *Beronodesmus* species by the relatively large body size (ca 2.0 mm wide) and the presence of three distal outgrowths on the gonopod femorite, **a**, **b** and **d**, both latter being prominent processes, coupled with a particularly long and slender solenophore (Figs 66 & 67). In addition, process **c**, which seems to have no homologues among congeners, is finely, but sufficiently clearly serrate at the ventral margin [Golovatch, 2014, 2015, 2016].

NAME. To emphasize gonofemoral process **c** being finely, but sufficiently clearly serrate at the ventral margin.

DESCRIPTION. Length ca 19 mm, width of midbody pro- and metazonae 1.8 and 2.0 mm, respectively (♂). Coloration in alcohol uniformly light yellowish to nearly pallid (Figs 52–54).

All characters as in *B. martensi* sp.n., except as follows.

Antennomere 2 > 3 = 4 = 5 = 6 > 1 > 7; interantennal isthmus ca 1.2 times as wide as diameter of antennal socket.

In width, head > segments 5–16 > collum = 2 = 3 = 4. Ozopores lateral, placed inside an ovoid pit located mostly at about rear 1/3 of metazonital length and at about half of metazonital height. Stricture dividing pro- and metazonae at most finely striolate dorsally at bottom. Epiproct (Fig. 62) short, conical, concave at apex, subapical lateral papillae poorly-developed. Hypoproct (Fig. 63) roundly subtrapeziform, faintly concave at caudal margin, caudal 1+1 setae well separated, not borne on knobs.

Sterna rather sparsely setose, cross-impressions weak, without modifications other than a prominent, setose, rounded lobe between coxae 4 (Fig. 64). Legs short, apparently stouter and longer in ♂, 1.2–1.3 times as long as midbody height (♂); prefemora clearly swollen laterally; in length, femora > tarsi > prefemora > postfemora = tibiae = coxae. Tibial brushes gradually thinning out towards legs of segment 15, tarsal brushes towards legs of segment 17. Ventral parabasal adenostyles on femora 1 prominent (Fig. 65).

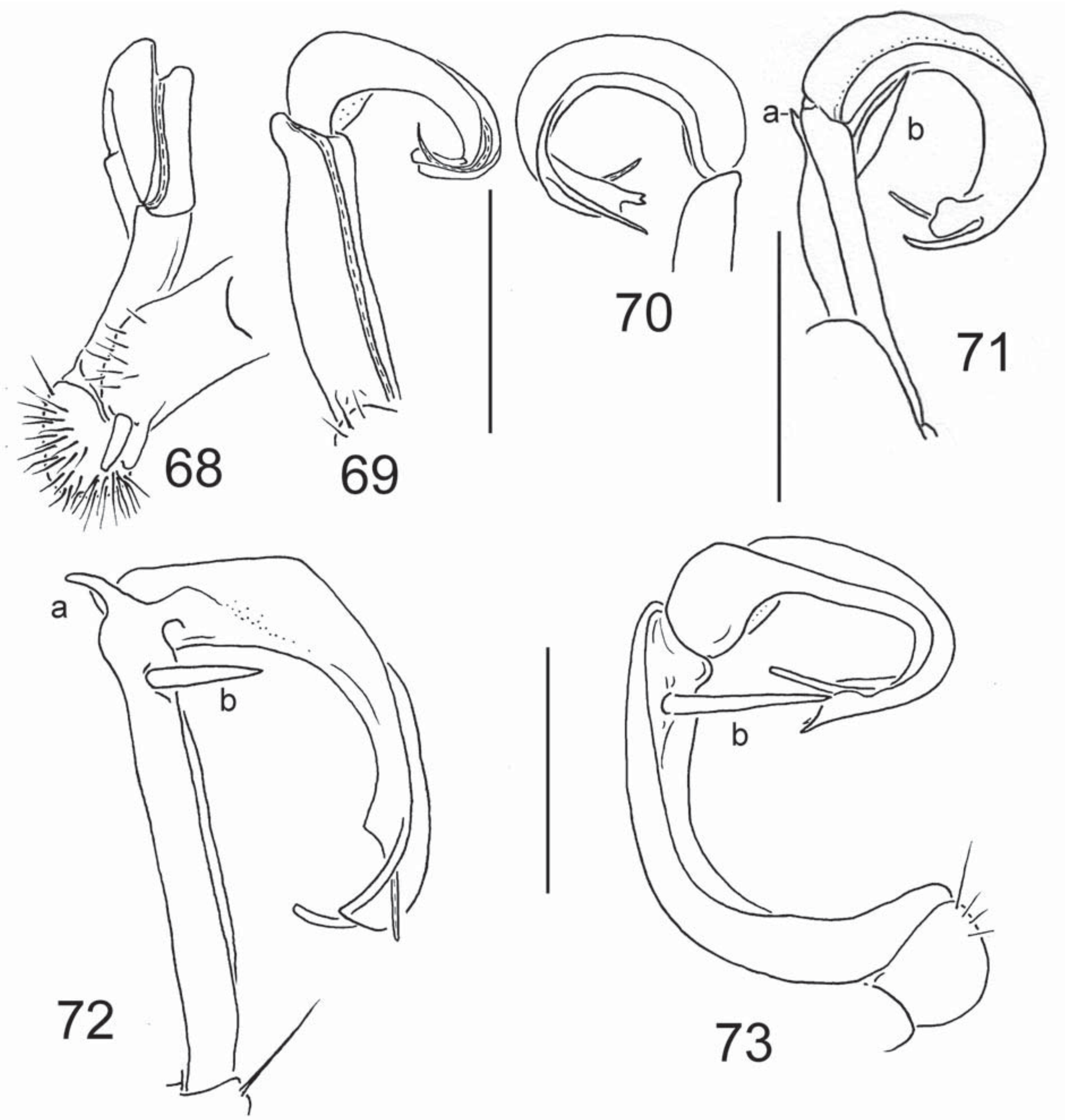
Gonopods (Figs 66 & 67) relatively complex; coxite subcylindrical, about 2/3 as long as femorite, with a ventral, parabasal, setose hump; prefemoral (= densely setose) part of telopodite short, about 1/3 as long as a rather slender, distally slightly enlarged, ribbon-shaped, faintly twisted and mesad slightly curved femorite, the latter with two distinct processes: **d** membranous, with a finely, but clearly serrate ventral margin, located at dorsal margin, but directed distoventrad; **b** very long, slender, spindle-shaped, directed ventrad perpendicular to femorite, placed close to its apical cingulum; **a** a small, but evident, rounded, dorso-apical lobe. Distal half of telopodite strongly curved anteromesad, subcircular, solenophore (**sph**) as long as a flagelliform solenomere (**sl**) it sheathes, with an evident ventral protuberance (**h**) at about **sph** midway.

REMARKS. The type locality of *B. serratus* sp.n. is shared with a syntopical population of *B. latispinosus* Golovatch, 2015 (see below).

At the moment, the genus *Beronodesmus* Golovatch, 2014, encompasses already 11 species, including both new ones described here [Golovatch, 2014, 2015, 2016]. All are endemic to Nepal. A key to eight of them is available [Golovatch, 2015]. However, to properly incorporate the three species described since, a new key is given below.

KEY TO KNOWN *BERONODESMUS* SPECIES (CHIEFLY BASED ON ♂ CHARACTERS):

1(2) Gonofemorite and solenophore devoid of any considerable processes or outgrowths (Figs 68–70). ................. .......................................... *B. simplex* Golovatch, 2016
2(1) Either both gonofemorite and solenophore or only the former with considerable processes or outgrowths. …. 3
3(4) Solenophore with a remarkably long, strong, caudomesal spine about midway. ................................................ ................................. *B. distospinosus* Golovatch, 2015
4(3) Solenophore without any spine about midway. ........ 5
5(6) Gonofemorite with two distal spines (a serrate **d** and a very long, spindle-shaped **b**) and a modest outgrowth **a** (Figs 66 & 67). .................................. *B. serratus* sp.n.
6(5) At most two distal outgrowths on gonopod .............. 7
7(8) Length ca 7 mm, width of midbody segments ca 0.8 mm (♂). Distofemoral process **b** of gonopod a large spine, whereas **a** a broad lobe. ... *B. minutus* Golovatch, 2015
8(7) ♂ length ≥ 10–11 mm, width ≥ 1.0 mm. At least distofemoral process **a** of gonopod different in shape. . ...................................................................................... 9
9(10) Distofemoral spines **a** and **b** of gonopod rather small, subequal in shape and size. ........................................... ......................................... *B. pallidus* Golovatch, 2014
10(9) Distofemoral spines **a** and **b** of gonopod sharply different in shape and size, lobe **a** sometimes up to absent. ..................................................................................... 11
11(12) Gonopod distofemoral process **b** a short spine, whereas **a** a rather small, sometimes rudimentary lobule. …..13
12(11) Gonopod distofemoral process **b** a long to very long spine, whereas **a** usually a rounded lobe. .................. 17
13(14) Distofemoral process **b** of gonopod a very short peg, **a** missing (Figs 59–61). .................... *B. martensi* sp.n.
14(13) Distofemoral process **b** of gonopod a short spine, whereas **a** a rounded, sometimes small lobe. ............ 15
15(16) Distofemoral process **b** of gonopod a very short spine, whereas **a** a prominent lobe. ................................ .................................... *B. curtispinus* Golovatch, 2015
16(15) Gonopod distofemoral process **b** a somewhat longer spine, whereas **a** a rudimentary lobule (Figs 71 & 72). ....................................... *B. gorkhalis* Golovatch, 2015
17(18) Distofemoral process **b** sinuate, extremely long and slender, nearly as long as and tightly appressed to sole-




Figs 68–73. *Beronodesmus simplex* Golovatch, 2016, ♂ from above Dhumpus (68–70), *B. gorkhalis* Golovatch, 2015, ♂ from above Barpak (71) and ♂ from Gompa (72), and *B. longispinus* Golovatch, 2015, ♂ from Pahakhola (73): right (68–70, 72, 73) or left gonopod (71), mesal, ventral, dorsal, lateral and laterial views, respectively. Scale bars: 1.0 (71) and 0.5 mm (68–70, 72, 73). Designations explained in text.

Рис. 68–73. *Beronodesmus simplex* Golovatch, 2016 (68–70), ♂ из окрестностей Dhumpus (68–70), *B. gorkhalis* Golovatch, 2015, ♂ из окрестностей Barpak (71) и ♂ из Gompa (72), а также *B. longispinus* Golovatch, 2015, ♂ из Pahakhola (73): правый (68–70, 72, 73) или левый гонопод (71), соответственно изнутри, снизу, сверху, сбоку и сбоку. Масштаб: 1,0 (71) и 0,5 мм (68–70, 72, 73). Объяснения обозначений в тексте.

nophore, whereas **a** a small spine. ................................
................................ *B. sinuatospinus* Golovatch, 2015

18(17) Distofemoral process **b** considerably shorter, suberect, whereas **a** a lobe. ........................................................ 19

19(20) Distofemoral process **b** a very strong, basally broad spine, whereas **a** a lobe. *B. latispinosus* Golovatch, 2015

20(19) Distofemoral process **b** a long and slender spine, whereas **a** a rounded lobule (Fig. 73). ..........................
.................................. *B. longispinus* Golovatch, 2015

*Beronodesmus latispinosus* Golovatch, 2015

MATERIAL. 2 ♂♂ (SMF), 1 ♂ (ZMUM ρ3472), Nepal, Taplejung Distr., pasture Lassetham NW of Yamputhin, 3300–3500 m a.s.l., mature *Abies-Rhododendron* forest, 6–9.V.1980, leg. J. Martens & A. Ausobsky.

REMARKS. The above samples represent near-topotypes [Golovatch, 2015] and are strictly syntopic with *B. serratus* sp.n. The species is known to be

relatively widespread in eastern Nepal, also being variable in gonopod structure [Golovatch, 2015, 2016].

*Beronodesmus simplex* Golovatch, 2016
Figs 68–70.

MATERIAL. 4 ♂♂, 9 ♀♀ (SMF), Nepal, Kaski Distr., above Dhumpus, broadleaved forest, litter, 2100 m a.s.l., Berlese extraction, 8–10.V.1980, leg. J. Martens & A. Ausobsky.

REMARKS. The above samples are strict topotypes [Golovatch, 2016]. New illustrations of the gonopod structure are provided (Figs 68–70) to confirm the species' identity, in particular the absence of considerable processes or outgrowths on both the femorite and solenophore.

*Beronodesmus gorkhalis* Golovatch, 2015
Figs 71 & 72.

MATERIAL. 1 ♂ (ZMUM ρ3473), Dolpo Distr., northern Dhaulagiri Himal, Gompa near Tarakot, 3300–3400 m a.s.l., *Picea-Betula* forest, 2–6.VI.1973, leg. J. Martens; 1 ♂ (SMF), Nepal, Gorkha Distr, Darondi Khola to above Barpak, 3600–3450 m a.s.l., forest, 10.VIII.1983; 2 ♂♂, 5 juv. (SMF), Gorkha Distr., Chuling Khola, Meme Kharka, 3300–3400 m a.s.l., 5–6.VIII.1983, all leg. J. Martens & W. Schawaller.

*Beronodesmus longispinus* Golovatch, 2015
Fig. 73.

MATERIAL. 4 ♂♂, 3 ♀♀, 3 juv. (SMF), Nepal, Sankhua Sabha Distr., above Pahakhola, 2600–2800 m a.s.l., *Quercus semecarpifolia* and *Rhododendron* forest, 31.V.–3.VI.1988, leg. J. Martens & W. Schawaller.

REMARKS. The above are near-topotypes, generally agreeing well with the original description [Golovatch, 2015], differ in the slightly less prominent lobe **a** (Fig. 73). This species in quite widespread in eastern Nepal [Golovatch, 2015, 2016].

*Beronodesmoides lobatus* Golovatch, 2015

MATERIAL. 1 ♂ (SMF), Nepal, Sankhua Sabha Distr., Kangla Khola E of Thudam, dwarf *Rhododendron*, rock debris, 4100–4200 m a.s.l., 24–25.V.1988, leg. J. Martens & W. Schawaller.

REMARKS. This is a near-topotype fully agreeing with the original description [Golovatch, 2015].

*Hirtodrepanum latigonopum* Golovatch, 1994

MATERIAL. 2 ♂♂, 5 ♀♀, 1 juv. (SMF), Nepal, Mustang Distr., Thakkhola, Kali Gandaki Valley between Annapurna and Dhaulagiri Himal, Chadziou Khola Valley, 2530–2600 m a.s.l., IX.1969, leg. J. Martens; 5 juv. (SMF), Nepal, Ilam Distr., Gitang Khola, 2550 m a.s.l., *Lithocarpus* forest, 28–31.III.1980, leg. J. Martens & A. Ausobsky.

REMARKS. These near-topotypes fully agree with the original description [Golovatch, 1994].

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